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gauging the benefits and value of the UK's national nature reserves

Peter Jones and Daphne Comfort look at some of the features of the UK's National Nature Reserves and consider how their benefits and value have been identified and measured

Natural England has described its National Nature Reserves as being 'at the heart of conservation in the 21st century'.¹ The announcement of the designation of what was described as the 'UK's first ever 'super' National Nature Reserve on Purbeck Heaths in Dorset', for example,² was accompanied by a promise from Tony Juniper, Chair of Natural England, that it would 'achieve big benefits for both people and wildlife'. In examining the contested role of natural capital in 'development and planning', Jones *et al.*³ suggested that the 'dominant government and business policy responses to the perceived natural capital challenge are rooted in attempts to frame nature and natural resources in economic and financial terms' and that this 'throws the issues of measurement and accounting into sharp relief'.

With these thoughts in mind, this article outlines some of the varied features of the UK's National Nature Reserves and explores some of the ways that the benefits and value of such reserves have been identified and measured.

National Nature Reserves

Selman has suggested that 'the recognition of sites with spiritual or symbolic significance stretches back millennia',⁴ but the origins of modern nature reserves are often traced back to medieval times, when landowners established game preserves for the protection of animals that they hunted. However, the idea of protecting animals to save them from dying out did not arise until the 19th century. Selman, for example, argued that the 'the modern

approach stems from the creation of national parks in the USA from the late 19th century'. The Yellowstone National Park in Wyoming, USA, was established in 1872, but a government-owned wildlife refuge was established in California in 1870 – although a small privately owned nature reserve was created in England at Walton Hall in West Yorkshire in 1821, and the first state-designated nature reserve at Drachenfels, then in Prussia, and now in Germany, dates from 1836.

In more modern times, National Nature Reserves (NNRs) were established in the UK to protect some of the most important habitats, species and geological formations, and to provide outdoor laboratories for research. Their statutory origins date from the 1949 National Parks and Access to the Countryside Act and the 1981 Wildlife and Countryside Act, and the majority are managed on behalf of the nation by the appropriate national conservation body (namely Natural England, Scottish Natural Heritage, Natural Resources Wales, or the Northern Ireland Environment Agency). A total of 224 NNRs have been designated in England, and the corresponding figures for Scotland, Wales and Northern Ireland are 43, 67 and 47, respectively.

The 381 NNRs within the UK include an extensive range of species, habitats and geological and geomorphological features, and are in a variety of geographical locations.

The most recently designated NNR, at Purbeck Heaths in Dorset, covers 3,330 hectares and combines three existing NNRs at Stoborough Heath, Hartland Moor, and Studland and Goldington



Hartland Moor National Nature Reserve, part of the first 'super' NNR

Heath, and provides a range of habitats, including lowland wet and dry heath, valley mires, acid grassland and woodland, as well as coastal sand dunes, lakes and saltmarsh and conifer plantations. This so-called 'super' NNR links '11 types of priority habitat to enable wildlife to move more easily across the landscape', thus giving 'rare and varied wildlife, including the sand lizard, the Dartford warbler, and the silver studded blue butterfly, a better chance of adapting and thriving in light of the current climate crisis'.² Natural England is working with a number of partners, including the National Trust, the Royal Society for the Protection of Birds, Forestry England, the Dorset Wildlife Trust, and the Amphibian and Reptile Conservation Trust, as well as the private Rempstone Estate, in managing the new NNR.

More generally, 20 years ago, English Nature, the predecessor to Natural England, identified 35 'spotlight' NNRs in an attempt to 'improve visitor satisfaction and understanding'.⁵ These spotlight reserves included Ainsdale Sand Dunes on Merseyside, Golitha Falls in Cornwall, Wicken Fen in Cambridgeshire, Ingleborough in North Yorkshire, and Sutton Park in the West Midlands, which together provide some illustration of the diversity of NNRs.

Ainsdale Sand Dunes NNR, 24 kilometres north of Liverpool, covers 508 hectares and was established in 1965 to protect the lime-rich sand dune complex, and the reserve also includes sandy beaches, dune grasslands, dune slacks, and pinewoods. Fauna on the dune grasslands include sand lizards, northern dune tiger beetles, vernal mining bees and

grasshoppers, and plants found there include biting stonecrop, sticky stork's bill, and heath dog violet, as well as the largest colony of the rare field gentian in the UK. Some 40% of the UK's dune slacks are found on the NNR, and when flooded in winter they provide habitats for natterjack toads, great crested newts, and dragonflies. The pinewoods are home to red squirrels, while the beach provides a rich feeding ground for a number of wading birds during autumn and winter.

Golitha Falls NNR is steep-sided valley, lined with ancient oak woodland, some of it dating back to the 11th century, along the River Fowey in West Cornwall, and it covers just 18 hectares. The NNR is home to many species of liverworts, hornworts and mosses, lichen and a range of species of butterfly, including the meadow brown, marbled white, green-veined white and silver-washed fritillary, while the river itself supports salmon and sea trout.

Wicken Fen in Cambridgeshire covers 785 hectares and provides a unique remnant of the undrained fenland which once covered the vast lowlands of East Anglia. The NNR was the first nature reserve owned by the National Trust, and offers a wetland home to over 9,000 species, including many rare species of plants, birds, and dragonflies.

Ingleborough NNR, covers 1,000 hectares, and includes a number of limestone pavements and houses a range of plants, including wood anemone, bluebell, and garlic-scented ramsons. Sutton Park NNR, a former medieval deer park on the eastern urban fringe of the West Midlands, covers 970 hectares and includes lowland heath, woodlands, and wetlands.

Ben Wyvis NNR, initially established in 1982 but since extended, lies 25 kilometres north east of Dingwall in the Scottish Highlands. It covers 2,300 hectares and encompasses the western and southern slopes of Ben Wyvis, and the summit plateau of Glas Leathad Mòr, which stands at 1,046 metres above sea level. The plant habitats include scattered native woodland and shrub-rich heath on the lower slopes, moorland further upland, and a mosaic of upland communities on the high tops and crags. The moss heath on the plateau, for example, is one of the most extensive examples of this habitat in Scotland, and management plans have focused on maintaining the number of herbivores at a sustainable level. The mosses provide a habitat for summer-nesting dotterel and ptarmigan.

Mar Lodge, in the Cairngorms, is Scotland's, and the UK's, largest NNR, covering some 29,000 hectares, and includes montane landscapes, heathered moors, and Caledonian pine forest. The moors, for example, offer habitats for red grouse, meadow pipit, willow warbler, stonechat, and great tits. Saint Abb's Head NNR, 9 kilometres north of Eyemouth in the Scottish Borders, provides nesting and breeding habitats for a 60,000-strong colony of seabirds which includes guillemots, razorbills, fulmars, shags, and herring gulls.

There are 67 NNRs within Wales, including Dan yr Ogof, a 17 kilometre cave system, 24 kilometres south west of Brecon; Newborough Warren, a beach and dune system on the Isle of Anglesey; Rhos Gogh in Mid Wales, a large raised bog which provides a habitat for willow warblers, curlew, lapwing, weed warbler, reed bunting, and damselflies; and Ty Canol in Pembrokeshire, where, it is claimed, volcanic rocks, gnarled oaks, ravens and an ancient burial chamber evoke a prehistoric atmosphere.

Northern Ireland's 47 NNRs also embrace a variety of landscapes and wildlife. The dune and woodland landscape of Murlough in County Down provides a habitat for a wide range of fauna, including over 600 species of butterflies and moths, pigmy shrews, stonechats, and dunlin. Lough Neagh is the largest lake in the UK, and attracts over 100,000 wintering wildfowl, including the whooper swan. The Giant's Causeway, on the coast of County Antrim, which is composed of some 40,000 basalt columns, was designated as an NNR in 1987, and provides a habitat for a range of seabirds, including fulmar, petrel, cormorant, shag, redshank, guillemot, and razorbill, and for a variety of plants, including sea spleenwort, hare's-foot trefoil, vernal squill, sea fescue, and frog orchid.

Identifying and measuring the benefits and value of NNRs

At a time of government expenditure cuts, both public and voluntary organisations face financial problems in funding their conservation work, and they increasingly need to be able to identify,

measure and demonstrate the value and benefits of this work. In addressing 'measuring the difference made by conservation initiatives', Ferraro and Pressey,⁶ for example, seem to pose some relevant questions, including:

'How much are protected areas contributing to the conservation of biological diversity and ecosystem services? How are these areas affecting the welfare of people who live near them, as well as other people who may enjoy the services (e.g. tourism) provided by the protected areas? Under what conditions do protected areas deliver their desired environmental and social impacts, and when do they deliver undesirable impacts?'

In looking to provide answers to such questions, identifying, and more particularly measuring, the benefits and value of nature conservation raises complex and challenging issues, and Ferraro and Pressey recognised that the 'answers to these questions are both contentious and important for ecosystem conservation in the twenty-first century'.⁶

At the same time, Jones argued that 'the assumption of intrinsic worth [...] was central to the foundation of the modern conservation movement'.⁷ In looking to the worth and benefits of conservation work, Ferraro and Pressey argued that 'conservation funders and practitioners are paying increasing attention to evaluating their investments with more scientifically rigorous evaluation designs'.⁶ That said, a range of rather different approaches have been employed in an attempt to identify and measure the benefits and value of NNRs, as outlined below.

At a simple level, and almost as an act of faith, in its *Strategy for England's Natural Nature Reserves*¹ Natural England highlighted four sets of benefits generated by NNRs: conservation; environmental research; people; and partnerships. In highlighting conservation, Natural England asserted that 'National Nature Reserves are our finest sites for wildlife and geology. Placed at the heart of healthy and strong landscapes, we can make sure their abundant wildlife brims over to enrich surrounding areas.' At the same time, it invited more landowners to join the NNR network, arguing that in so doing they would be 'helping to reflect the diversity, range and richness of our natural heritage'.

In addressing environmental research, Natural England claimed that 'National Nature Reserves are our natural laboratories', that 'they will be widely used for experimentation and long term monitoring to increase our understanding of our natural environment', and that 'they will demonstrate the very best conservation practice and inspire environmental scientists, young and old alike'.¹ For people, NNRs are seen to be 'high quality and accessible habitats' that 'offer many ways to enjoy and engage with our natural heritage. Whether improving our wellbeing,



Birdwatchers and viewing hide at Shapwick Heath National Nature Reserve

taking part in citizen science opportunities or volunteering, we will help more people get actively involved in their local site.' In encouraging partnerships, Natural England outlined the benefits of building on existing partnerships 'to create stronger links between National Nature Reserves and their surrounding landscapes and communities'.¹

Attempts have been made to identify the conservation benefits of NNRs on a small scale and at local level. In its brief 2019 report on the Isle of Noss NNR, for example, Scottish Natural Heritage⁸ recorded that it had been a successful breeding season for many species of seabirds, including arctic skua, great skua, shag, puffin, gannet, and arctic tern, and that there were regular sightings of otters, thrush nightingales, two-barred crossbills, and sub-alpine warblers. More specifically, the previous year's report⁹ gave information on variations over time in the breeding productivity of a number of seabirds, including shag and arctic tern, and on increased attendance at the island's guillemot colony. Scottish Natural Heritage also reported that over 2,200 people had visited Noss during 2019,⁸ and reported on research on great skua pellets to ascertain details of their diet.

In 2013 Natural England reported on a project designed to investigate the economic impacts of NNRs in England.¹⁰ This desk-based study provided a summary estimates for all 143 NNRs managed by Natural England at that time and a more detailed assessment of six NNRs: Wye Downs, Derbyshire Dales, Stiperstones, Shapwick Heath, Saltfleetby Thedlethorpe Dunes, and Moor House – Upper Teesdale. The overall assessment revealed that the NNRs supported 208 full-time-equivalent jobs and generated £9.2 million of GVA (gross value added) in their local economies, while visitor expenditure generated a further 344 full-time-equivalent jobs and £10.8 million of GVA. Moor House – Upper Teesdale, the largest of the six NNRs selected for more

detailed assessment, generated a total of 38 full-time-equivalent jobs and £880,000 of GVA.

More recently, and arguably more rigorously, in 2019 Natural England published *Accounting for National Nature Reserves*,¹¹ based on natural capital accounting methods. In his foreword to the report, Tim Hill, Natural England's Chief Scientist, suggested that the aims were to 'understand the state of our assets; what ecosystem services they provide; what the benefits are; and the economic value of the benefits' and to 'report across all these components' in order to 'inform comprehensive decision-making'. The report's authors claimed to have 'taken an innovative approach to Natural Capital Accounting' and to have 'used an extended balance sheet, which displays the state of our assets, services, benefits and their economic value next to each other'. They emphasised that the work was 'grounded in the ecological evidence' and that 'evidence gaps and confidence intervals' were highlighted, both of which were seen to be 'essential to support transparent decision-making'.

The report estimated 'the monetary value of quantifiable benefits from NNRs to be in excess of £36 million per year with a natural capital asset value in excess of £1.8 billion', and argued that the 'most significant benefits provided by NNRs are thriving wildlife, equitable climate and cultural services wellbeing'. It was estimated, for example, that NNRs managed by Natural England 'sequester around 185,000 tonnes of CO₂ equivalent per year', that 'this provides annual benefits of around £12 million', and that 'the value of carbon sequestration is expected to rise sharply over the next 50 years'. The report also estimated the 'monetary benefits to society from recreational and educational visits and volunteer work as being of the order of £24 million per annum, with an asset value of around £774 million'. However, the authors acknowledged that 'we are not able to estimate the magnitude of other cultural

benefits or thriving wildlife, except to note that they are very significant'.

In a similar vein, Scottish Natural Heritage¹² reported on its work designed to gain a 'better understanding of the stocks of natural capital' on land it either owns or primarily manages, 'most of which is National Nature Reserve'. This land included seven types of habitat – coastal, freshwater, mires/bogs/fens, grassland, shrub heathland, woodland, and montane. The findings reveal that Scottish Natural Heritage's land 'generates an estimated £28m worth of benefits each year'. The most valuable benefits that were monetised were tourism and recreation and climate regulation. The report's steering group took the decision to adopt a non-monetary approach to biodiversity, and here a natural capital index revealed that the habitat features of 83% of freshwater sites and 73 % of coastal sites were classed as favourable, while the corresponding figures for woodland and shrub heathland were 32% and 28%, respectively.

Returning to the study of NNR's in England,¹¹ the authors concluded that 'Natural England's NNRs offer significant benefits to society' and, perhaps reassuringly, that 'the most significant benefits are in line with the NNRs' core purposes of thriving wildlife, scientific research and recreation.' Looking to the future, the report emphasised that 'to ensure that the benefits continue, or increase, we need to understand, protect and invest in the ecology'. Here, the report recommends that such activities are best undertaken at site level and recognised that, while its approach did not offer a management tool for NNRs, it did provide a valuable perspective, not only on the management process but also for more informed long-term strategic decision-making.

Conclusion

The NNRs have been described as 'the crown jewels of our natural heritage',¹¹ and those responsible for managing the NNRs have looked to identify, and seemingly more importantly to use, natural capital accounting methods to measure the value of these assets. Those environmentalists and conservationist who see "natural capital" as primary and sacrosanct¹³ may be concerned that Natural England and Scottish Natural Heritage have attempted to use natural capital accounting to measure biodiversity or how well wildlife is thriving, and, more generally, they may rail against framing nature and its conservation in financial and economic terms. Well over a century after they were written, and in a rather different context, the words of Oscar Wilde seem to resonate: 'Nowadays people know the price of everything and the value of nothing.'¹⁴

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Notes

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